International Journal of Physiology, Sports and Physical Education

**ISSN Print:** 2664-7710
**ISSN Online:** 2664-7729
**Impact Factor:** RJIF 8.00
IJPSPE 2023; 5(2): 19-22
www.physicaleducationjournal.net
Received: 19-03-2023
Accepted: 23-04-2023

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# Motor fitness comparison between junior national level and academy level volleyball players

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**DOI:** https://doi.org/10.33545/26647710.2023.v5.i2a.51

**Abstract**
**Background:** Volleyball is a high-speed ball game that is popular worldwide. In addition to game-related skills, volleyball players need to be in excellent physical and motor condition. Some people refer to motor fitness as skill-related fitness. The aim of the present study helps to assess junior national and academy level volleyball players' physical fitness, weaknesses, and strengths.
**Methods:** A total of one hundred twenty junior national and academy-level volleyball players were selected as subjects for the present study. All the subjects' ages were 14-17 years. By considering various variables, the subjects' motor fitness was identified. Agility was measured by 4x10m shuttle run, vertical jump to measure the leg explosive power and endurance was measured by chinning up and 800m run. An independent *t*-test was applied to check the level of significance. The significance level was set at $p<0.05$and comparison appropriate inferential statistical tools SPSS have been used for the analysis of gathered data.
**Results:** The present study clearly shows that the vertical jump result is close to average, but academy players are numerically superior to junior national-level volleyball players. On the other hand, junior national volleyball players are better than academy level volleyball players in agility and cardiovascular endurance tests. The junior national volleyball players are better in JCR fitness test than the academy volleyball players.
**Conclusion:** Finally we can state that physical fitness or total motor fitness level of junior national level volleyball players is better than the similar academy level volleyball players.

**Keywords:** Motor fitness, volleyball players, cardiovascular endurance, leg explosive power

## Introduction
One of the most widely played sports in the world is volleyball [1]. Day by day volleyball is becoming a popular sport like football and cricket in Bangladesh. Volleyball is a high-speed game that requires physical fitness such as athleticism, endurance and power. All occupations, including those of students, physicians, engineers, scientists, and politicians, as well as volleyball players, demand a certain level of physical fitness and well-being [2-3]. Volleyball players need to have strong upper- and lower-body muscles as well as maximum aerobic power ($VO_2$ max) [4]. The fundamentals of physical fitness are discussed, along with advice on how to create a personalized exercise and physical activity plan [5]. According to the current body of knowledge in exercise science and how society views physical fitness, a definition of physical fitness should emphasize fitness's impact on one's health [6]. One aspect of total force fitness is physical fitness, which also includes mental, behavioral, medical, nutritional, spiritual, and social wellness [7]. Fitness is understood as the ability to do some work. Motor fitness is sometimes referred to as skill-related fitness [8]. Motor fitness is a term that describes a person's ability to perform effectively during sports or other physical activities. Motor fitness, according to Barrow (1968) is "a readiness or preparedness with special regard for big muscle activity without undue fatigue" [9]. Motor fitness means being ableto control and coordinate your body's movements so that you can do physical tasks. Motor fitness components are speed, agility, endurance, shuttle run, balance, coordination, power and reaction time [10]. Many factors effect on motor fitness including age, sex, nutrition, and engaging in movement activities [11].
Motor fitness is a critical issue for improving any sports performance. In volleyball, physical fitness is vital, and players' performances are greatly impacted by their overall health [1].

Skills, training, motivation, and physiological factors all affect performance [1]. It is not possible to measure motor fitness with a single test because motor fitness depends on several components of different nature. Lack of physical fitness, is a menace to our security as well as sports performance [12]. Generally, motor fitness is measured by measuring various components using several tests [13]. All the subjects gave their informed consent and volunteered to participate in the study. The present study helps to assess both groups of players' physical condition, weaknesses, and strengths. Whether appropriate physical training is being received by junior national-level volleyball players compared to their counterparts in academy volleyball players needs to be checked to justify proper fitness training.

## Methodology

A total of one hundred twenty (120) junior national and academy-level volleyball players were selected as subjects for the present study. Sixty were junior national level volleyball players and sixty were academy-level volleyball players. All the subjects' ages were 14-17 years. The living area of subject is various division of Bangladesh. The motor fitness of the subjects was measured by assessing different components. Agility was measured by 4x10m shuttle run test, vertical jump to measure the power of the legs in jumping vertically upward and endurance was measured by chinning up and 800 m run. In the present study, some instruments and tools were used for collecting data, such as measuring tape, a weight machine, a chin-up bar, a jump board, two markers, stopwatch, an athletic track, a data sheet and pen. All tests were conducted as per standard procedure.

Standard statistical procedure was used was calculated. Mean was calculated as a measure of central tendency by using the formula:

$$\overline{X} = \frac{\sum X}{N}$$

Where, $\overline{X}$donates the mean, $\sum$ X denote the sum total of scores and N denotes the number of scores.

The standard deviation (SD) was calculated as the measure of variability by using the formula:

$$SD\ (\sigma) = \sqrt{\frac{(X-\overline{X})^2}{N}}$$

Where, σ denotes the standard deviation, $\sum(X-\overline{X})^2$ denote the total of square of the deviation and N denote the number of scores.

An independent t-test was applied to check the level of significance. The significance level was set at $p<0.05$ and comparison appropriate inferential statistical tools SPSS have been used for the analysis of gathered data [14].

## Results

**Table 1:** Mean and Standard Deviation of all parameters

| | Vertical Jump (Ft.lb) | | Chin Up (Number) | | Shuttle Run (Second) | | 800m Run (Second) | |
|---|---|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| Academy Boys | 364.53 | ±73.39 | 7.67 | ±1.79 | 10.11 | ±0.71 | 151.60 | ±2.11 |
| Junior Nation Boys | 363.27 | ±81.87 | 8.88 | ±1.41 | 9.28 | ±0.59 | 152.22 | ±2.10 |

In table number 1 vertical jump mean value of academy players is 364.53lb; SD ±73.39 and mean value of junior national players is 363.27lb; SD ±81.87. The result is close to but in these present study we can say that academy players are numerically superior to the junior national players. Chin up mean value of academy players is 7.67; SD ±1.79 and mean value of junior national players 8.88; SD ±1.41. Shuttle run mean value of academy players is 10.11; SD ±0.71 and mean value of junior national players 9.28; SD ±0.59. 800m run mean value of academy players is 151.60; SD ±2.11 and mean value of junior national players 152.22; SD ±2.10.

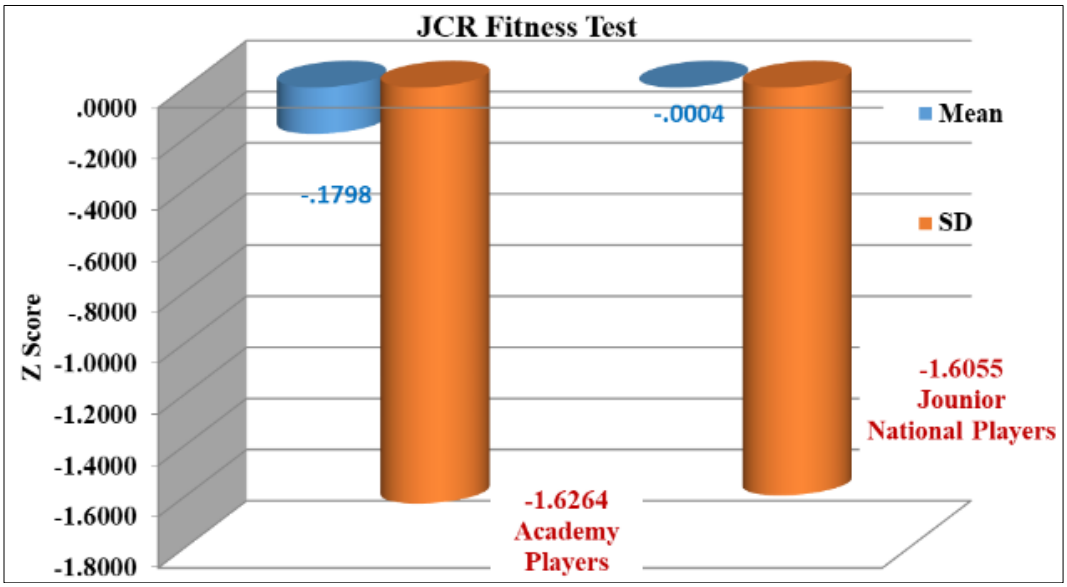


**Fig 1:** JCR fitness test

In the figure number 1 makes it clear that, total JCR fitness test define as Z score. The mean value of academy players is -.1798 and standard deviation is -1.6264. In addition mean value of junior national players is -.0004 and standard deviation is -1.6055. Intrinsically we need to know that Z score have counted from +1 to -1 so that -.0004 is getter than -.1798. So finally we can state that fitness level of junior national level players is better than academy players.

**Table 2:** Independent sample test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |
|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) |
| Vertical Jump | Equal variances assumed | .222 | .640 | .446 | 118 | .658 |
| | Equal variances not assumed | | | .446 | 117.410 | .658 |
| Chin Up | Equal variances assumed | 3.406 | .068 | -3.510 | 118 | .001 |
| | Equal variances not assumed | | | -3.510 | 108.170 | .001 |
| Shuttle Run | Equal variances assumed | 1.219 | .271 | 6.339 | 118 | .000 |
| | Equal variances not assumed | | | 6.339 | 115.571 | .000 |
| 800m Run | Equal variances assumed | 2.220 | .294 | 6.920 | 118 | .001 |
| | Equal variances not assumed | | | 6.920 | 116.571 | .001 |
| JCR Fitness Total Score | Equal variances assumed | .043 | .753 | .002 | 118 | .98 |
| | Equal variances not assumed | | | .002 | 114.959 | .998 |

In the table number2clearly shows that academy volleyball players and junior national volleyball players made no significance difference in the vertical jump as $t_{0.05}$ (118) = 0.446 and $p$= 0.658 (2- tailed); on the other hand boys made significant difference in chain-ups as $t_{0.05}$ (118) = -3.510 and $p$=0.001; shuttle run as $t_{0.05}$ (118) = 6.339 and $p$=.000 and 800m run as $t_{0.05}$ (118) = 6.920 and $p$=.001. Finally the JCR fitness total score as $t_{0.05}$ (118) = 0.002 and $p$= 0.98.

## Discussion

Volleyball is a popular team sport worldwide. Physical fitness, motor fitness, or game-related fitness are much needed for volleyball sports. Speed, agility, balance, coordination, and power are some of the variables that characterize a person's performance abilities, which are referred to as their motor fitness or motor ability [15]. The majority of earlier volleyball research suggests that body height and body composition are crucial factors in game performance [16]. The main finding of the present study was to compare motor fitness ability between junior national level and academy level volleyball players. The present study clearly shows that the vertical jump result is close to average, but academy players are numerically superior to junior national-level players. A previous study about volleyball players declared that national-level volleyball players have greater jump performance than lower-level adult volleyball players [17]. This has been observed in players of various levels in the past [18–19], which may indicate that all players had roughly equivalent relative leg muscle power, but the selected players' leg exclusive power is slightly different. The physical attributes of successful volleyball players include height, leanness, a high level of jumping ability, and technical and tactical proficiency [17-22].

On the other hand, junior national volleyball players are better than academy volleyball players in agility and cardiovascular endurance tests. Junior national volleyball players also did better in the JCR fitness test. The findings of this study support those of [23] who discovered that volleyball vascular endurance tests. Junior national volleyball players also did better in the JCR fitness test. The results of the present study are in accordance with the findings of [23] who found that volleyball players of the national team of Canada had significantly higher fitness values compared with university-level volleyball players [17]. A previous study compared the physical, physiological, and performance traits of volleyball players at the national-leveland college levels and discovered that the national-level players had significantly higher block and spike jumps, 20-meter speeds, and $VO_2$ max values, indicating that physiological capacities play a significant role in the development and selection of elite volleyball players [18, 23]. Again, research found that volleyball players on a national team did not differ in anthropometric characteristics compare dual endurance tests. Junior national volleyball players also did better in the JCR fitness test. The results of the present study are in accordance with the findings of [23], who found that volleyball players of the national team of Canada had significantly higher fitness values compared with university-level volleyball players [17]. A previous study compared the physical, physiological, and performance traits of volleyball players at the national-level and college levels and discovered that the national-level players had significantly higher block and spike jumps, 20-meter speeds, and $VO_2$ max values, indicating that physiological capacities play a significant role in the development and selection of elite volleyball players [18, 23]. Once more, research revealed that volleyball players on national teams did not differ in anthropometric traits from those on university teams, but they were noticeably faster, had better vertical jump performance, as well as superior strength and aerobic fitness [23]. Now we clearly declare that the present study is fully supported by the previous research without vertical jump or leg explosive power.

Some limitations of the present study were time, finances, and modern instruments. The present study tried to compare the performances of both groups of players, but it was a limitation. Therefore, it may be suggested that national volleyball players coaches focus on leg explosive power and academy coaches focus on endurance and agility with total motor fitness. A future study can include more participants and modern tools for data collection and analysis.

## Conclusions

In conclusion, academy volleyball players are a little bit better than junior national volleyball players in vertical jump numerically but not statistically. On the other hand, junior national volleyball players are better than academy volleyball players in chin-ups, shuttle run and 800m run test statistically. The junior national volleyball players are better in JCR fitness test than the academy volleyball players.

Finally we can state that physical fitness or total motor fitness level of junior national level volleyball players is better than the similar academy level volleyball players.

**Study Limitation**

A real drawback for the current study was the subjects' motivation and willingness to participate in the test. The present study was likewise constrained by time and money. The equipment utilized to gauge various aspects of fitness was not of a very high caliber.

**Sources of funding**

There was no specific grant from a funding agency in the public, commercial, or nonprofit sectors for this research.

**Acknowledgement**

The researchers are grateful to the all subjects who have participated in this research on an unpaid basis.

**Competing interests**

No conflicting interests have been disclosed by the authors.

**Data availability statement**

All the original contributions presented in this manuscript are included in the article.

**Ethical statement**

The study followed all the core principles of ethical integrity in research.

**Authors contributions**

JFR conceived the design research and critically review the article. MRI and FTJM collected the data. MYA calculation and write the article.

**Replication of results**

The necessary information for replication of the results is present in the manuscript.

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